assemblage (2017): 15-27

Observing social change on the Bothnian Bay coast in the 1st millennium BC: The burials of Tahkokangas and the community of the Oulujoki river estuary

by AKI HAKONEN, VILLE HAKAMÄKI and JARI-MATTI KUUSELA,
University of Oulu, archaeology.

Abstract: This paper provides a case study of social development from the Late Bronze and Early Iron Age on the Bothnian Bay coast. The focus is on the burial site of Tahkokangas and the ancient Oulujoki river estuary in Finland. The archaeological record of the area is marked by numerous cooking pit and stone burial sites. By analysing the nature of the stone structures in Tahkokangas and the distribution of the surrounding sites, an attempt is made to see through the material remains into the community itself. In particular, aspects of social transformation such as the inner socio-political workings of the community are studied. The resulting interpretation is that the local community of the Oulujoki river was connected to a European-wide economic network, which acted as a catalyst for social stratification. Individuals who gained access to trade also gained prominence with their peers and rose in hierarchy to eventually establish their own political entity. Tahkokangas is interpreted as a manifestation of this. The structures at the site are identified as burials that housed the high ranking dead. Those who rose to high rank within the studied community were dependent on the access to trade and eventually, when long-distance trade became unreliable, a social reorganization was carried out.

Keywords: Northern Finland, Bronze Age, Iron Age, burials, social archaeology, trade network, topography

Introduction

The Bothnian Bay at the centre of the Fennoscandian peninsula seems peripheral from most perspectives. Just south of the Arctic Circle, the frigidity of winter here is exemplified by the annual freezing of the bay. The high northern latitude has resulted in a remarkable geography. During the last glacial period, ice sheets up to 3 km in thickness covered Fennoscandia, compressing the ground underneath. The pressure was released as the ice melted early in the Holocene, about ten millennia ago, triggering an ongoing post-glacial rebound. (Salonen *et al.* 2002: 18–23.) The bay is marked by large rivers and their estuaries, flowing to the sea from the surrounding mountains and highlands. For the people living here, the forests, rivers, and the sea have offered many necessities for life. In addition the waterways offer navigable routes for movement of people and things. For millennia people have followed the coastline as the new land slowly rises from the sea, benefiting from the resources and contacts the location provides.

This study focuses on the people who inhabited the Oulujoki river estuary in Northern Ostrobothnia, Finland, during the 1st millennium BC. By collating the archaeological sites found from the area, a narrative of the local community is constructed. The main focus is on the burial site of Tahkokangas in Oulu (Figure 1) excavated in 2011.

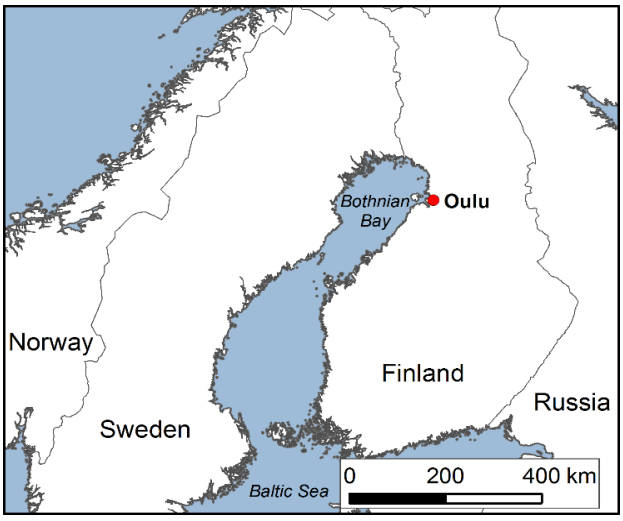

Figure 1. Oulu and the Bothnian Bay in Fennoscandia

Aki Hakonen et al. – aki.hakonen@student.oulu.fi
University of Oulu

The description of the site and field research

Tahkokangas was discovered by archaeologists in 1983. The site (Finnish National Board of Antiquities registry number: 564010023) is located on a moraine ridge in a park within the limits of the city of Oulu. Running on a northwest-southeast axis, the ridge is approximately 300 metres long, 30 metres wide and on average 2 metres higher than the surrounding plane. The ridge is covered by rocks and moraine overlain by moss, while the surrounding soil is sandy podsol. The gradient of the ridge is less than 15° on the southwest side, while the gradient in northeast side is about 20°. A 150m² irregularly shaped boulder field is located on the southwest slope. A foot path runs along the ridge. Thirteen nearly indistinguishable stone settings have been identified on the ridge, five along the path and eight clustered in the boulder field (Figure 2.) Early on, the site was interpreted as a prehistoric burial ground. Stone burial cairns and smaller settings are a common feature in the region's prehistory starting from the Late Neolithic of the 3rd millennium BC (Okkonen 2003). The site remained in obscurity until a survey of the plane surrounding the ridge was conducted in 2010. In total 44 test pits were dug and soil samples were taken for phosphorus testing. No archaeological material was found and the test results showed no anomalies in phosphorus levels, which lead to the conclusion that the activity related to the site was confined to the settings on the ridge.

In 2011 an excavation of the stone settings was undertaken, with the objective of confirming their structural nature after deturfing and determining their function and date (Kuusela 2011, 2012).

A total of nine suspected structures were excavated. The structures were numbered based on the order of documentation. Settings 3 and 4 (abbreviation S3, S4) were determined as naturally formed or recent, while the remaining were assessed as prehistoric. Settings 1, 2, 5, 6, 7 and 8 were excavated completely, while S10 was partly excavated. Settings 9 and 11 were also deturfed and documented. The excavation was conducted with the removal of stone layers, with each layer documented separately. The stones forming the outer edges of the settings were left in place. Once the stone layers were removed, test pits were dug in the moraine in order to study the vertical extent of the structures and to make sure the soil did not contain any finds or unusual colouring. Soil samples were taken for phosphorus testing, which proved unreliable due to the varying grain size of moraine. A laser scanner was used for the documentation of the boulder field and the structures contained within it. (Kuusela 2012: 5; Hakonen, Kuusela and Okkonen 2015.)

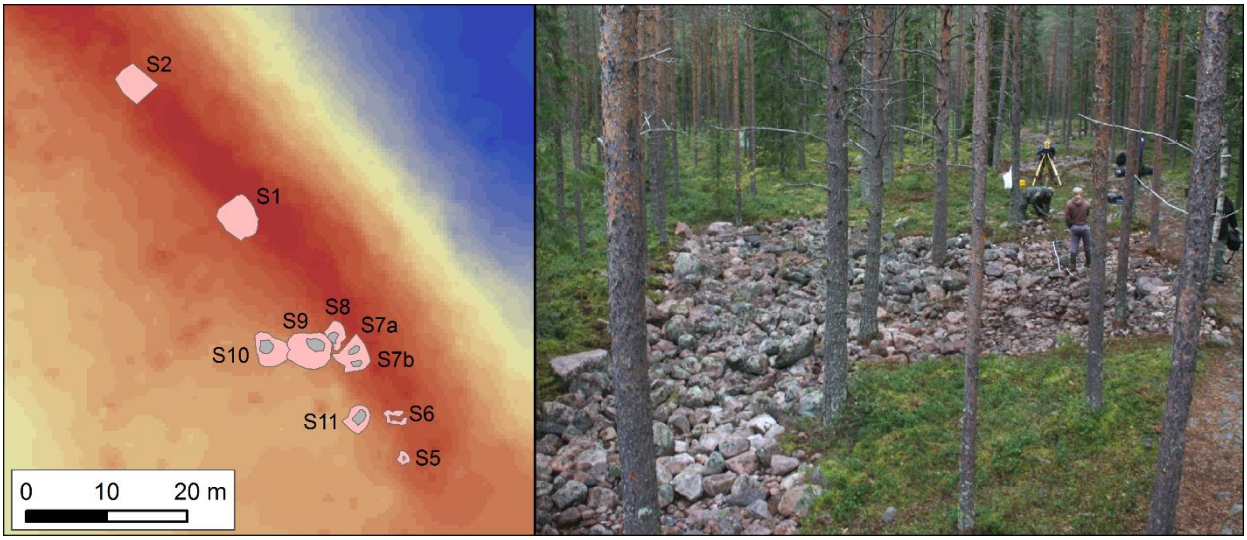

Figure 2.Tahkokangas and its stone setting burials. Map on the left is based on total station measurements. Photograph of the boulder field taken towards northwest by Hannu Panttila, M.A.

Analysis of the structures

The following analysis utilizes laser scanning (Hakonen, Kuusela and Okkonen 2015) and total station measurements, supported by field documentation. Three of the stone settings contain multiple structures. Connected to S2's main structure is a smaller rectangular cist-like encirclement (designated here as S2b). After deturfing, S7 was perceived to consist of two adjacent encirclements (Kuusela 2012, p. 12), designated here as S7a and S7b. After the excavation, analysis of the laser scanning data revealed a two-part crescent shaped encirclement connected to S9a, which was designated as S9b and S9c (Hakonen, Kuusela and Okkonen 2015). Measurements of the settings are presented in Table 1 and their central cavities in Table 2. The measurements of Settings 1, 2, 2b, 5 and 6 are from field documentation and the total station data and the measurements of Settings 7a, 7b, 8, 9, 9b, 10 and 11 are from the 3D data. S1 and 2 were the only settings completely covered by stones, and also similar in size. The difference between them is the inner structure. While S1 contained a small central cavity, which resembled a cist filled with stones, S2 did not have any clear internal structure, besides its stone framing (Figure 3). Because of this the inner cavity of S2 has the largest surface area of all the settings at the site. S2 contained the only apparent prehistoric find at the site: a fragment of a flint scraper (Figure 4). While S2b is built into S2, it shares the closest structural resemblance with S6. The shape of both can be described as rounded rectangle and they have distinctly set walls with a central cavity. The northeast end of S6 has apparently been damaged by the footpath, which caused the encircling walls to be partly opened, forming a U-shape. It seems likely that the walls were originally continuous. S5 is similar but smaller, in fact the smallest of all the settings, and round in shape, but has a clear central cavity.

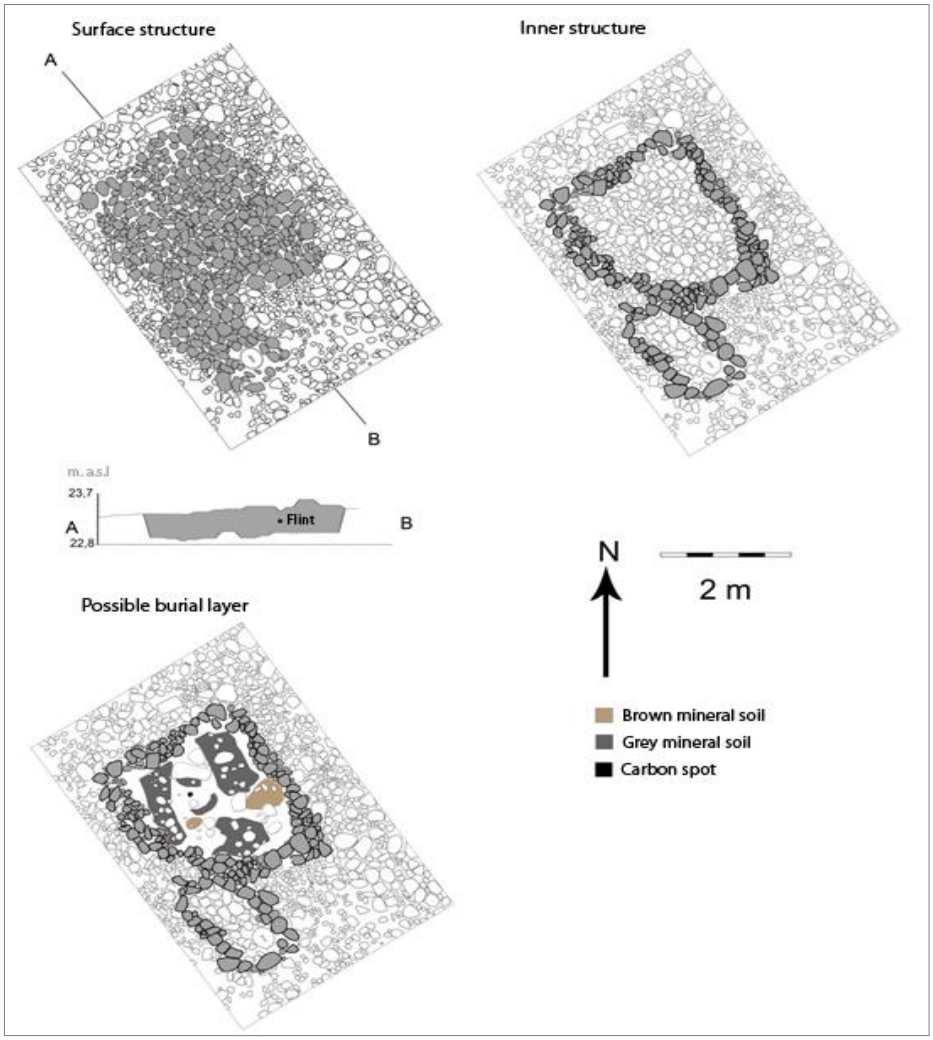

Figure 3. Plan drawings of Setting 2 and 2b.

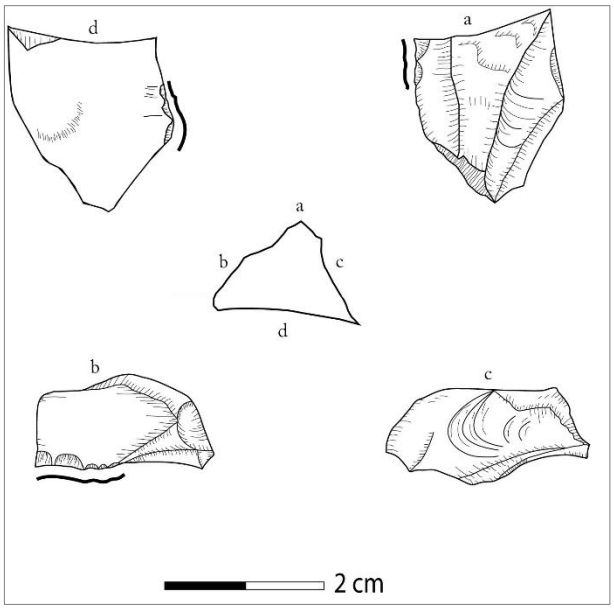

Figure 4. The fragment of a flint scraper found in Setting 2

Settings 7a, 7b and 8 are situated in a line on the upper part of the boulder field. They have central cavities and are less than 2.5 metres in diameter. All three were at least partly damaged prior to their excavation. The three settings were built closely together, but S8 is also connected to S9a. S9a is the largest structure at the site and has comparatively high walls. It has the largest surface area, although the central cavity of S2 is larger than the cavity of S9a. Settings 9b and 9c were built into the southwest wall of S9a, forming a semicircle extension. Therefore the former are clearly later additions, as the dividing wall had to have been there first. (Hakonen, Kuusela and Okkonen 2015: 231.)

Setting 10, which is situated at the bottom of the boulder field, is of uncertain nature. It is unlike the others as it seems to contain only the central depression without distinct walls. A large piece of plastic sheeting was uncovered under the stones on the surface of the depression. (Kuusela 2012: 16) This lead to the setting being categorized as modern, but inspection of the 3D data casted doubt on this. The northwest edge of the cavity seems to have caved in, possibly causing the sheet to be buried under the sliding stones. Setting 11 seems to be the best preserved encirclement setting at the site. It has shallow walls surrounding a depression of nearly the same surface area as S9a, while having the total size of little more than 2/3 of S9a. A standing stone 46 cm in height might be connected to the structure, possibly acting as a marker. (Hakonen, Kuusela and Okkonen 2015, p.231.)

The most notable structural difference is the forms of S1 and S2, whose cavities are filled with stones, while the others have open central cavities. This might mean that some of the enclosure settings have been dug into, but the regularity of the walls indicates that most if not all of the central depressions have been purposely designed. There are also significant variations in size. The largest setting both horizontally and vertically is S9a. Its most notable attribute is the height of the walls, which dwarf the other stone settings. The average height of the walls of S9a is 0.5 metres, while the other settings are only an average of 0.1-0.2m high. It is clearly the largest in complete surface area, although the surface area of the central depression is comparable to S2 and S11. This suggests that S9a had either a differing function or it was unique made for other reasons.

Updated shore displacement chronology

Because no datable material was excavated, rendering radiocarbon dating inapplicable, shore displacement chronology (SDC) offers the best possibility for dating. The method, based on a mathematical equation determining the emergence of land due to post-glacial rebound, does not date the site itself, but the different shore phases of the surrounding landmass. The method is applicable only because post-glacial rebound has consistently been stronger in the area than marine transgression. The equation is $y = (vt) - (½dt^2)$, where y is the height from sea level, v the relative land uplift, t the time in centuries, with 2011 acting as the current date (the date of the elevation model of the region), and d the percentage of the approximated decrease in land uplift rate (Okkonen 1998: 52–53; 2003: 85). v is determined by sea-level gauge readings from 1922–88, which indicate the value at the coast of Oulu as 0.69+/-0.04 cm/year (Vermeer *et al.* 1988: 63, Table 18). The decrease in land uplift rate has been calculated as 1.5 percent per century in relation to relative land uplift (Okkonen 1998: 53), meaning the value is transformed applicable to the equation by $v \times (-0.015)=d$. Thus the equation for calculating the median coastal height in 500 BC in relation to the

current sea level is (0.69 × 25.11) - (½ × -0.01035 × 25.11 2) = 20.7358. The likely dispersal of the equation is acquired by changing the value v to 0.73 and 0.65 accordingly to the +/- 0.04 cm dispersal, which means the coastal height in 500 BC was between 21.9 metres above sea level (m.a.s.l.) and 19.5 m.a.s.l. with the median of 20.7 m.a.s.l. By transforming the dispersal from m.a.s.l. to years, the coastline of e.g. 740+/-140 BC can be determined to be currently located at 23 m.a.s.l. At this stage the ridge at Tahkokangas began rising from the sea.

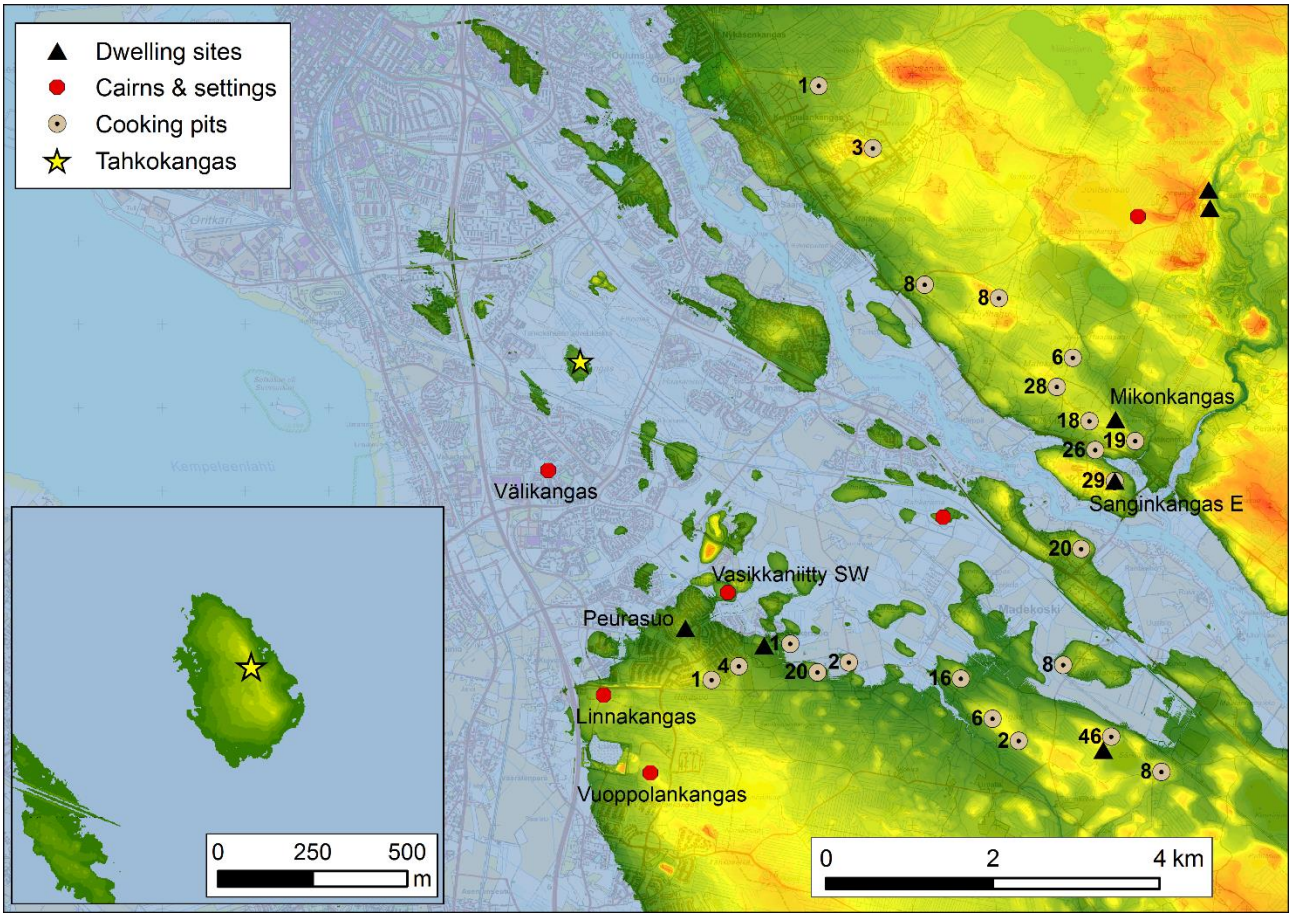

Figure 3. The Oulujoki river estuary at 20 metres above current sea-level (445±125 BC), the surrounding archaeological sites and the amount of cooking pits. Elevation and background maps made by the National Survey of Finland. The contemporary island of Tahkokangas shown in the lower left corner.

Comparison with contemporary burial sites

Two sites with clear structural similarities to Tahkokangas have been excavated. Both have been proven as Iron Age burial sites. The best structural parallel for S1 and S2 is found at Itärova (no: 240010062) in Kemi, where two shallow stone covered settings have been discovered. The site is situated on a moraine ridge similar to Tahkokangas. One of the settings was excavated in 1992. The setting contained an inhumation burial with a single piece of unburned bone together with a heavily corroded iron object, possibly a spearhead or a knife (Krankka 1993: 4; Okkonen 2003: 64). While the bone itself has not been dated, SDC places the emergence of the ridge to 600+/-120 BC and the site remained an island until joining the continent in 200+/-100 BC. The time of the use of the site has previously been determined as 200–1 BC (Krankka 1993: 5), although the updated SDC used here extends the earliest possible date to 380+/-100 BC, which is the date when the site was at 2 m.a.s.l. The burial layer was found underneath the stone structure. This seems to be reflected at Tahkokangas, where the solitary flint object was found 30 cm below the top surface of S2. Underneath the find in S2 were patches of discoloured soil (Kuusela 2012: 9), which may either be natural, or anomalies caused by the decomposition of a corpse. The only apparent

differences between the two stone structures of the two sites are the single find, the other being iron and the other flint.

The other comparable site is Tervakangas (no: 678010017) in Raahe. Especially S8 in Tahkokangas is similar to Cairn 2 of Tervakangas. Both structures are shallow round enclosures of similar size, S8 being 2.4 x 2.3 m and Cairn 2 being approximately 2 x 1.5 m, although while S8 contained no finds, Cairn 2 contained some 500 g of burnt bone, a bronze anklet and a ring (Forss, Itäpalo and Jarva 1992; Jarva 1999). Similarities between Tervakangas and Tahkokangas can also be found when comparing Cairn 8 to S2b and S6. Cairn 8 is a small oval shaped shallow enclosure with a central cavity (Forss, Itäpalo and Jarva 1994), akin to both settings and also similar to S5. Cairn 8, S2b, S5 and S6 all have distinguishable coffin structures. SDC provides the date for the emergence of Tervakangas site as 380+/-120 BC, with the earliest possible building phase in 180+/-100 BC. Calibrated radiocarbon dates acquired from the site are 99 BC – AD 256 and AD 112–241 (Kuusela 2013: Appendix 1).

Surrounding landscape and archaeological environs

Tahkokangas is located on the ancient estuary of Oulujoki River. As previously mentioned, the ridge emerged from the sea as an island in 740+/-120 BC. It remained as the farthest island from the estuary until 440+/-120 BC, when shoals and skerries began emerging in the west. Tahkokangas fused with a larger island in 100+/-100 BC and merged with the continent in AD 160+/-100. The earliest possible date of use for the site can be determined as 630+/-120 BC.

There are at least 33 different prehistoric sites in the vicinity of Tahkokangas, some of which contain multiple types of remains (Figure 5; Table 3). The sites and their registry numbers are listed in Table 3. Pits without defined functions and sites with uncertain dates have been omitted from the study. The most common type is cooking pits. They are on average 1–2 metres wide and 1 metre deep pits, their bottom lined with burnt rocks and charcoal. In total 22 sites with approximately 280 cooking pits are situated along the shore of the ancient river estuary. Their distribution indicates a connection between the cooking pits and the sea shore. The distance of the cooking pits from the shoreline of 430+/-120 BC (at 20 metres above current sea level) vary from 40 metres to 1020 metres, with the median of 320 metres and the mean of 200. The values are greatly affected by the anomalous distances of the two most northern cooking pits, which are situated at 1020 metres and 970 metres from the shore. This suggests variation in the temporality of remains. One of the sites, Metsokangas which contains a solitary cooking pit, has been excavated and radiocarbon dated to cal. BC 790–390 (Äikäs and Ikäheimo 2005: 8). The date reflects the dates of other radiocarbon dated cooking pits close by: Hangaskangas E (no: 1000006785), 14 km southeast of Tahkokangas, is dated to cal. BC 760–410 (Pesonen 2013: 39 Tables), Jauholaarinkangas (no: 425010041) in Liminka, 22 km southwest of Tahkokangas, cal. BC 560–360 and Hangaskangas (no: 139010035) in Ii, 40 km north, cal. BC 760–390 (Kuusela 2013: Appendix 2). The radiocarbon dates and the placement of cooking pits, conforming to the shoreline of the Late Bronze Age/Early Iron Age river estuary, assert the rough contemporaneity of the cooking pits. Nevertheless some variation in their distance to shore also suggests some temporal variation.

The second most frequent remain type is stone structures, either the more prominent cairns or the shallower settings. The most notable site is Välikangas, which was excavated in 1987–88. It contains four burial cairns with 12 burials and numerous finds such as remains of iron weapons, ceramics and other miscellaneous grave goods (Mäkivuoti 1996: 123). While it is located only 1.4 km from Tahkokangas, it is clearly a later burial as indicated by not only the lavish burial goods, but also the structure of the cairns and their maximum elevation of 15 m.a.s.l. Typology of the finds indicates a date of AD 150–600/650 (Mäkivuoti 1996: 123) while SDC suggests the site's earliest possible use at around AD 120+/-100. 2.8 km south of Välikangas is Linnakangas, which is a single cairn. It was excavated in 1983. The finds were comprised of a corroded copper ring, a flint strike-a- light, burnt bone and a fragment of a harp seal skull. The cairn was assessed to be Early or Mid-Iron Age (500 BC – AD 600), a rough date indicated by iron content mixed with the copper in the ring and by the shore displacement chronology at the time (Mäkivuoti 1983, 1985). Contrary to this date, harp seals are believed to have become extinct in northern Baltic Sea at around 1000 BC (Ukkonen 2001: 30). Road building has disturbed the natural topography of the cairn's surroundings, but even a rough estimation with the revised SDC indicates a terminus post

quem of 800–1300 BC. The cairn may in fact belong to an earlier Bronze Age phase. Possibly related is the solitary unexcavated cairn of Vuoppolankangas, which has the earliest possible SDC date of 1340+/-160 BC.

The remaining three sites are single stone settings, of which Pitkäkangas and Vehkakangas have apparently been destroyed. Elevations of both settings have been estimated as 20 m.a.s.l. and the topography of their reported locations suggest a possible temporal connection with Tahkokangas. The remaining stone setting, Vasikkaniitty SW, was excavated in 2003. No finds other than a piece of a shotgun shell casing was found, but the setting was determined to having been built as two connected stone encirclements. Although the moss covering the setting was relatively thick (Leppiaho and Pääkkönen 2003), it is doubtful whether this is a prehistoric structure. Because of recent development of the surrounding landscape, the SDC date is relatively ambiguous, but indicates the likely possible time of use as 750+/-150–100+/- 100 BC. After this the distance from the setting to the shore was over 200 metres and rapidly growing.

Five dwelling sites have been discovered in the vicinity of Tahkokangas. None contain structural remains, but have been assigned as dwelling sites because the finds consist of large numbers of quartz flakes. The nature of Särkilampi and Sanginkangas E are uncertain as they have not been excavated. Both sites are relatively ambiguous, although Sanginkangas E also consists of 29 cooking pits and Särkilampi NW with 46 cooking pits is only a few hundred metres from Särkilampi. The two dwelling sites may either reflect habitation related to the cooking pits or they may indicate areas of manufacture and production. The more pronounced dwelling sites, where multiple artefact types have been found are also near cooking pits. Test pits dug at Navettakangas contained numerous quartz flakes, stone artefacts and burnt stones (Ikäheimo 2001: 44), while the more thoroughly excavated Mikonkangas N contained quartz flakes, stone artefacts, burnt bone and burnt sand and also elevated phosphorus levels (Maijanen and Suvanto 2002: 4–8). The only completely excavated dwelling site is Pyöriäsuo, which is 1 km west of Navettakangas. The finds at Pyöriäsuo consisted of 1600 quartz or quartzite flakes, 40 stone artefacts, most of which are quartz scrapers, and five pottery fragments. On the other hand no anomalies in phosphorus levels could be identified, indicating the site was not used at least for permanent settlement (Herva 2004; Seppä 2011).

There appears to be a link between the dwelling sites and the cooking pits. Examining the quantity of cooking pits within 2 km buffers centring on the dwelling sites indicate that Mikonkangas N is at the most prominent location, surrounded by 154 cooking pits. The buffer of the nearby Sanginkangas E encompasses 146 cooking pits. The same for the ambiguous site of Särkilampi is 86, while for both Pyöriäsuo and Navettakangas the number is only 28. The vast majority of the cooking pits centre on the north side of the river and within an area of 4 km in diameter. This may indicate the main dwelling area for the local prehistoric community.

Signs of social, political and economic transformation

Morphological connections confirm that Tahkokangas is most likely a burial site. As no burnt bone was found, the burials were probably inhumations. Decomposition of corpses may have left only indistinguishable traces in the moraine, as anomalies in soil colouring were identified underneath S2. The two sites, Itärova and Tervakangas, which are structurally the most similar to Tahkokangas date to ca. 400–1 BC and 300 BC – AD 250. SDC suggests a similar date for Tahkokangas. Its island phase and the time when construction of the graves was possible, lasted from 630+/-120 BC to 100+/-100 BC. This may be the likeliest time of use for the site, since there is no specific reason for its use after the ridge became an indistinguishable part of the mainland. The island had a dominating presence, being the farthest from the estuary until 440+/-120 BC. Before its fusion with other islands, anyone travelling by the coast would have noticed the island even without previous knowledge of the burials. The surrounding sitescape refers to increased human activity at the time, especially embodied by the large number of cooking pits. Other possible burial sites that can be connected to this period are small in scale, containing only a single structure. Tahkokangas is in fact the largest prehistoric burial site on the 1 millennium BC river estuary.

It has been argued that not every member of prehistoric societies in Fennoscandia were granted a burial cairn or a setting (Asplund 2008: 355; Kuusela 2009; Lang 2007: 224; Meinander 1980: 10; Miettinen 1998: 64; Mägi 2002: 11, 74, 123; Pihlman 2004). Only 17

possible burial structures have been found in the Oulujoki river estuary of the 1st millennium BC. If distributed evenly throughout the millennium, this would amount to roughly one burial structure per 60 years. Burial cairns emerged already during the Neolithic at the same time as social stratification within communities began to consolidate (Costopoulos *et al.* 2012; Okkonen 2003: 224–225). This suggests that also the burials at Tahkokangas represent the most prominent members of the community, a proto-elite. When investigated as such, the burial structures seem to reflect social competition between the buried.

Relationships between the site's burial structures seem to communicate connections. For instance S2 and S2b, while having different structural form, are adjoined. It is probable that S2b is a later addition, as it is much smaller and without the larger S2 its location would be peripheral to the rest of the site. In fact the presence of S2 gives a reason for the presence of S2b. If the smaller burial was built next to the larger one, it can be interpreted as a sign of communication connecting the buried possibly through kinship or ancestry. A similar case is between S9a, S9b and S9c. Setting 9a is the most prominent of the burials at Tahkokangas, placed in the middle of the shallower settings in the boulder field, seemingly for the purpose of dominating the site. Its surface area as well as the height of the walls compared to the next largest setting is a clear indication of the purposefulness of its construction. A reasonable assumption is that the users of the cemetery also noticed the social parallel indicated by the different sizes of burial structures (see Kuusela 2009: 41; Kuusela, Vaneeckhout and Okkonen 2010: 24, 35). Why S9b and S9c were built into S9a can again be answered as communication of connection: later influential individuals trying to connect themselves to prominent ancestors, or connecting their deceased kin while using the same connection as conduit for respect and influence. Depending on the timespan between the burials, the actual connection may not be as significant as what is communicated, which is a link through time to powerful individuals.

To understand what gave the proto-elite its influence, the role of cooking pits must be considered. Cooking pits have been interpreted as remains of economic activity. Interpretations for their use vary, some suggesting seal train oil production, some the production of smoked salmon, while some have suggested their use in general food preparation (e.g. Ikäheimo 2005: 781; Okkonen and Äikäs 2006; Ylimaunu 1999). Other interpretations link the cooking pits with the production of goods for trade (Baudou 1992: 108; Holmblad 2010: 157; Ylimaunu, Ylimaunu and Okkonen 1999: 150–153). Although the radiocarbon dates of the cooking pits on the Finnish coast of the Gulf of Bothnia show significant variation, from ca. 2000 BC to AD 1600, the bulk of the dates coincide with the transition from the Finnish Bronze Age to Iron Age, ca. 700–300 BC (Kuusela 2013: 120).

After this period cooking pits become increasingly rare. The change has recently been connected to the larger context of the European trade network, where volume of trade increased significantly after the 9th century BC, due to increased demand in the rapidly urbanizing Mediterranean. These networks formed a web of trade extending even to the Bothnian Bay coast (Kuusela 2013: 130–131). Possibly the most important article of trade that is visible in the archaeological record was bronze. The earliest bronze object from the region was found in a burial radiocarbon dated to 1940–1730 BC. The burial was located at the Late Neolithic/Early Bronze Age Oulu River estuary at some 15 km southeast of Tahkokangas (Ikäheimo 2005: 780). While the source of bronze in prehistoric Finland has been hypothesized as eastern (Huurre 1986: 261–269), the copper in the prehistoric bronze objects in southern Sweden have been traced back to European, largely Mediterranean, sources (Ling *et al.* 2014). As the Gulf of Bothnia forms an accessible trade route, there is no reason to assume that some of the bronze flowing into Sweden from the south did not move further north.

The acquisition of bronze may in fact have been a prime motive for the use of the cooking pits. Bronze was a valued exotic commodity and having access to it was basically a source of influence in itself. The material could be transformed and given influence through gifting or ritualistic methods, so those who had better access to bronze had better opportunities for gaining influence (Kristiansen 1998: 54–56). It seems unlikely that this access was distributed evenly within communities, instead of contributing to social stratification. A reasonable assumption is that those in the community with more access to exotic goods and through whom redistribution of these goods was performed gained more influence than those with less access. Gradually, through the use of accumulated influence, enterprising individuals could

concentrate local trade to their own hands, making them indispensable to their communities, thus gaining political influence. On this account, the cooking pits might be a product of feasting and redistribution similar to North American potlatch, the custom which has been observed in many societies in a similar economic phase, where concentration of material wealth serves as a catalyst for social differentiation (e.g. Boas 1966; Cole 1991; Kan 1989; Malinowski 1922; Mauss 1970 [1954]).

According to this scenario, the elite were highly dependent on maintaining their influence on trade. When the European wide trade network experienced difficulties due to warfare in the Mediterranean, its effects eventually reached the Bothnian Bay coast (Kuusela 2013: 131–132). Tahkokangas may in fact signal an attempt to change the political dynamics of the community. When the wealth-based elite were struck with weakened economy, or possibly prior to this, it tried to ritualize its power, solidifying its influence and severing its dependence on trade. The cemetery may represent ancestral worship, which can be used to legitimize distinct social and political elite (see e.g. Baum 2004; Earle 2002: 378). However, this transformation did not reach a consolidated state. After the abandonment of Tahkokangas, the archaeological record of the Oulu River estuary is mute until the construction of the burial cairns of Välikangas in the next millennium, a leaving a gap of several hundred years. This may indicate a social reorganization, which resulted in the levelling of social hierarchy. This in turn resulted in the abolishment of sedentary trade posts, as well as the end of organized production and socially structured burials.

Conclusions and further discussion

The overall presentation of the archaeological remains of the 1st millennium BC Oulu River estuary reflects a grander scheme. The local community seems to have been in a continuous state of development. The people lived as hunter-gatherer-fishers, using the resources of the land, sea and the river. On the basis of the amount of resources available, the community may have been semi-sedentary or perhaps even fully sedentary, as the sea and the river allows plenty of resources even during winter. Furthermore, the early 1st millennium BC contact with expanding trade encouraged sedentism. The community acted as a gateway for trade between the coast and the inland, with the river as the main route. Wealth and influence were accumulated by individuals, who used cooking pits as means of gaining political power. These individuals began to hegemonize decision-making, thus forming a proto-elite, who used the cemetery of Tahkokangas to transform their wealth-based power to ideological power, by aligning themselves to influential ancestors. How far this socio- political transformation developed is not entirely clear. The cooking pits of Oulu River were abandoned by 200 BC, a delayed effect of the collapse of the trade networks which the proto-elite were dependent on. The absence of archaeological sites in the area from around 200 BC to AD 200 suggests a reorganization, which had a profound impact on the community.

The interpretation presented here is based on limited material evidence, thus avenues for criticism are abundant. Three directions for further study are evident. The first is to acquire more radiocarbon dates from cooking pits. This should provide some clarity regarding the connection between cooking pits and shore displacement chronology, which facilitates the relative dating of large sets of unexcavated sites. Still, even this will not probably provide a conclusive answer to whether cooking pits in large clusters are practically contemporary. The second is to analyse the copper contents of bronze objects and determine whether they are connected to the same network as those in southern Sweden. The third direction is to study with a similarly detailed focus the other river estuaries of the Bothnian Bay. Whether the same scheme repeats itself uniformly throughout the region remains to be seen.

Acknowledgements

The authors would like to thank university lecturer Ph.D. Jari Okkonen for his advice and expertise on prehistoric stone structures, and in general. Also Ph.D. Janne Ikäheimo and Ph.D. Tiina Äikäs are acknowledged for their comments.

Bibliography

Äikäs, T. and Ikäheimo, J. 2005. *Hiilen murusia ja muutama palanut kivi*. Muinaistutkija 4, pp. 2–14.

Asplund, H. 2008. *Kymittæ : sites, centrality and long-term settlement change in the Kemiönsaari region in SW Finland*. Annales Universitatis Turkuensis B 312. Turun yliopisto: Turku.

Baudou, E. 1992. *Norrlands Forntid – ett historisk perspektiv*. Wiken: Höganäs.

Baum, R. 2004. Ritual and Rationality: Religious Roots of the Bureaucratic State in Ancient China. *Social Evolution & History* 3, pp. 41–68.

Boas, F. 1966. *Kwakiutl Ethnography*. The University of Chicago Press: Chicago & London.

Cole, D. 1991. The history of Kwakiutl potlatch. In: Jonaitis, A. (ed.). *Chiefly Feasts. The Enduring Kwakiutl Potlach*. University of Washington Press: Seattle & London, pp.135–168.

Costopoulos, A., Vaneeckhout, S., Okkonen, J., Hulse, E., Paberzyte, I. and Wren, C.D. 2012. Social Complexity in the Mid-Holocene Northeastern Bothnian Gulf. *European Journal of Archaeology* 15, pp. 41–60.

Earle, T. 2002. *Bronze Age Economics. The Beginnings of Political Economies*. Westview Press.

Forss, A., Itäpalo, J. and Jarva, E. 1992. *Saloisten Tervakankaan rautakautisen kalmiston tutkimus 1991*. Unpublished excavation report. Archived in the Archaeology Laboratory, University of Oulu.

Forss, A., Itäpalo, J. and Jarva, E. 1994. *Raahen Saloisten Tervakankaan rautakautisen kalmiston tutkimus 1993*. Unpublished excavation report. Archived in the Archaeology Laboratory, University of Oulu.

Hakonen, A., Kuusela, J-M. and Okkonen, J. 2015. Assessing the application of laser scanning and 3D inspection in the study of prehistoric cairn sites: The case study of Tahkokangas, Northern Finland. *Journal of Archaeological Science: Reports,* Volume 2, pp. 227–234.

Herva, V-P. 2004. *Oulu Kiviniemi Pyöriäsuo. Varhaismetallikautisen asuinpaikan kaivaustutkimus 17.-28.5.2004*. Unpublished excavation report. Archived in the Archaeology Laboratory, University of Oulu.

Holmblad, P. 2010. *Coastal Communities on the Move. House and Polity Interaction in Southern Ostrobothnia 1500 BC – AD 1*. University of Umeå [Online]. Available from: http://umu.diva-portal.org/smash/get/diva2:349824/FULLTEXT01.pdf [accessed 4.6.2014].

Huurre, M. 1986. Esihistoria. In: Huurre, M. and Keränen, J. (eds.). *Kainuun historia 1*. Kainuun Maakuntaliitto: Kajaani, pp. 5–200.

Ikäheimo, J. 2001. *Oulu Metsokangas. Tutkimuskertomus kaavarunkoalueen arkeologisesta inventoinnista*. Unpublished survey report. Accessed in Archaeology Laboratory, University of Oulu.

Ikäheimo, J. 2005. Re-assessing the Bronze Age of Coastal Northern Ostrobothnia – the lower Oulujoki river valley. In: Goldhahn, R.J. (ed.). *Mellan sten och järn. Rapport från det 9:e nordiska bronsålderssymposiet, Göteborg 2003-10-09/12*. Institutionen för arkeologi och antikens kultur, Göteborg Universitet, pp.771-784.

Jarva, E. 1999. A Look at Ankles: Two Bronze Rings from the Roman Iron Age Necropolis of Tervakangas (Raahe) in Northern Ostrobothnia. *Faravid* 22–23. *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* XXII–XXIII, pp. 95–106.

Kan, S. 1989. *Symbolic Immortality. The Tlingit Potlatch of the Nineteenth Century*. Smithsonian Institution Press: Washington and London.

Krankka, P. 1993. *Kemin Itärovan rautakautisen kalmiston tutkimus 1992*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Kristiansen, K. 1998. *Europe Before History*. Cambridge University Press: Cambridge.

Kuusela, J-M. 2009. Masters of the Burial Grounds – Elites, Power and Ritual During the Middle Iron Age in Vähäkyrö. *Fennoscandia archaeologica* XXVI, pp. 39–52.

Kuusela, J-M. 2011. *Oulu Tahkokangas. Rautakautisen röykkiökohteen kartoitus ja lähialueiden koekaivaus syksyllä 2010*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Kuusela, J-M. 2012. *Oulu Tahkokangas. Rautakautisen röykkiökohteen kaivaus syyskesällä 2011*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Kuusela, J-M. 2013. *Development of political economy of Bronze- and Iron Age societies on the eastern coast of the Bothnian Bay ca. 1500 BC – AD 1300*. Doctoral thesis, University of Oulu. Juvenes Print: Oulu.

Kuusela, J-M, Vaneeckhout, S. and Okkonen, J. 2010. Places of importance and social communication: Studying the Pre-Roman cairn field of Viirikallio in Laihia, Finland. *Estonian Journal of Archaeology* 14, pp. 22–39.

Lang, V. 2007. *The Bronze and Early Iron Ages in Estonia*. Tartu University Press: Tartu.

Leppiaho, A. and Pääkkönen, M. 2003: *Oulu Kiviniemi Vasikkaniitty SW kivilatomuksen kaivaus*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Ling, J., Stos-Gale, Z., Grandin, L., Billström, K., Hjärthner-Holdar, E. and Persson, P-O. 2014. Moving metals II: provenancing Scandinavian Bronze Age artefacts by lead isotope and elemental analyses. *Journal of Archaeological Science* 41, pp. 106–132.

Maijanen, H. and Suvanto, M. 2002. *Oulun Mikonkangas. Pronssikautisen asuinpaikan koekuopitus 21. - 25.5.2001*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Malinowski, B. 1922. *Argonauts of the Western Pacific. An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*. Routledge & Kegan Paul: London, New York.

Mauss, M. 1970 [1954]. *The Gift. Forms and Functions of Exchange in Archaic Societies*. Cohen & West Ltd: London.

Meinander, C.F. 1980. The Finnish society during the 8th–12th centuries. In: *Fenno-ugri et Slavi* 1978. University of Helsinki: Helsinki, pp. 7–13.

Miettinen, M. 1998. *Laihian historia. 1, Esihistoria*, Laihian kunta: Laihia.

Mägi, M. 2002. *At the Crossroads of Space and Time: Graves, Changing Society and Ideology on Saaremaa (Ösel), 9th–13th Centuries AD*. University of Tallinn: Tallinn.

Mäkivuoti, M. 1983. Kempeleen Linnakankaan lapinrauniotutkimus kesällä 1983. *Faravid* 7, *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* VII, pp. 29–38.

Mäkivuoti, M. 1985. Kempeleen Linnakankaan löydöistä ja ajoituksesta. *Faravid* 9, *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* IX, pp. 25–30.

Mäkivuoti, M. 1996. *Oulun Kaakkurin Välikankaan rautakautinen kalmisto*. Licenciate thesis. University of Oulu: Oulu.

Okkonen, J. 1998. *Muinaiset kivirakennelmat Keski- ja Pohjois-Pohjanmaalla*. Licenciate thesis. University of Oulu: Oulu.

Okkonen, J. 2003. *Jättiläisen hautoja ja hirveitä kiviröykkiöitä – Pohjanmaan muinaisten kivirakennelmien arkeologiaa*. Acta Universitatis Ouluensis B 52. Oulun yliopisto: Oulu.

Okkonen, J. and Äikäs, T. 2006. Oulun seudun varhaismetallikautiset keittokuopat – käyttötarkoitus ja konteksti. *Faravid* 30, *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* XXX, pp. 17–23.

Pesonen, P. 2013. Oulu Hangaskangas E. Kivi- ja pronssikautisen asuinpaikan arkeologinen kaivaus 14.6.–20.7.2012. Excavation report. Museovirasto, Arkeologiset kenttäpalvelut. [Online] Available from: http://kulttuuriymparisto.nba.fi/netsovellus/rekisteriportaali/mjhanke/read/asp/r_hanke_rapo_det.aspx?HANKE_ID=9945 [accessed 4.6.2014].

Pihlman, S. 2004. *Väestöräjähdys historiallisen ajan taitteessa? Voisiko aineistoja tulkita toisinkin?* Aboa 66–67, pp. 44–77.

Salonen, V.-P., Eronen, M. & Saarnisto, M. 2002. *Käytännön maaperägeologia*. Kirja-Aurora, Turku.

Seppä, J. 2011. *Oulu Pyöriäsuo. mj-rek. nro 564010037. varhaismetallikautisen asuinpaikan kaivaus*. Unpublished excavation report. Accessed in Archaeology Laboratory, University of Oulu.

Vermeer, M., Kakkuri, J., Mälkki, P., Boman, H., Kahma, K.K. and Leppäranta, M. 1988. Land uplift and sea level variability spectrum using fully measured monthly means of tide gauge readings. *Finnish Marine Research* 256, pp. 3–76.

Ukkonen, P., 2001. *Shaped by the Ice Age: Reconstructing the history of mammals in Finland during the Late Pleistocene and Early Holocene*. Academic dissertation. University of Helsinki: Helsinki.

Ylimaunu, T. 1999. Iin Hangaskankaan keittokuopan rasva-analyysi. *Faravid* 22–23. *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* XXII–XXIII, pp. 95–106.

Ylimaunu, J., Ylimaunu, T. and Okkonen, J. 1999. Hylkeenpyynnin kehityksestä ja merkityksestä Itämerellä esihistoriallisella ajalla. *Faravid* 22–23. *Pohjois-Suomen historiallisen yhdistyksen vuosikirja* XXII–XXIII, pp. 95–106

Appendices

Table 1. Measurements of the settings (in metres).

Setting	Length	Width	Height	Area (m²)
S1 [a]	3.6	2.9	0.1	<10.4
S2 [a]	3.1	2.9	0.2	<7.0
S2b [a]	2.0	1.3	0.2	<2.6
S5 [a]	1.8	1.6	0.2	<2.9
S6 [a]	2.7	1.9	0.2	<5.1
S7a [b]	2.0	1.4	0.1	2.1
S7b [b]	1.8	1.7	0.2	2.6
S8 [b]	2.4	2.3	0.2	4.0
S9a [b]	5.7	3.3	0.5	13.7
S9b [b]	2.1	2.1	0.2	4.5
S9c [b]	1.5	2.7	0.2	3.0
S10 [b]	2.7	2.2	0.1	4.6
S11 [b]	3.2	2.7	0.1	7.5

[a] Total station measurements.

[b] 3D data measurements.

Table 2. Measurements of the inner cavities (in metres).

Setting	Length	Width	Depth	Area (m²)
S1 [a c]	1.0	0.8	X	<0.8
S2 [a c]	2.3	2.0	~0.3	<4.6
S2b [a]	1.5	0.7	X	<1.1
S5 [a]	0.5	0.4	0.2	<0.2
S6 [a]	1.5	0.7	0.2	<1.1
S7a [b]	1.2	0.5	0.3	0.5
S7b [b]	1.4	1.3	0.3	1.4
S8 [b]	1.5	1.1	0.4	1.3
S9 [b]	3.0	1.5	0.6	3.0
S9b [b]	1.5	1.2	0.3	2.7
S9c [b]	1.1	0.9	0.4	0.9
S10 [b]	1.9	1.3	0.4	2.0
S11 [b]	2.5	1.8	0.4	2.8

[a] Total station measurements.

[b] 3D data measurements.

[c] Stone filled cavities, structural form uncovered during excavation.

Aki Hakonen et al. – aki.hakonen@student.oulu.fi
University of Oulu